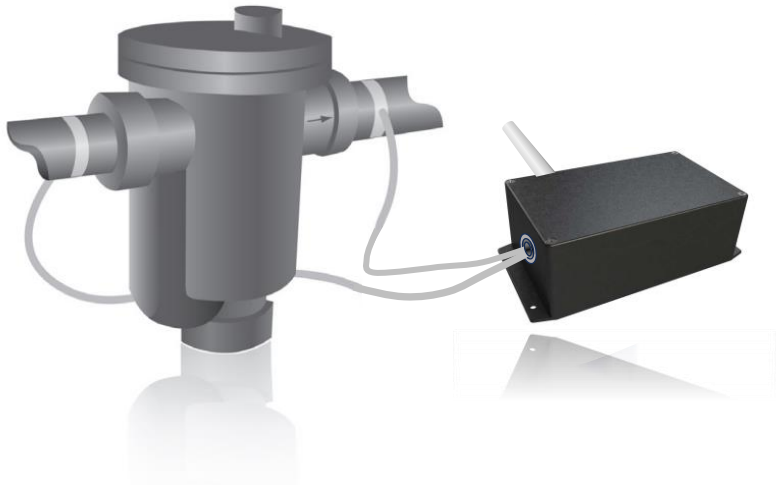
Wireless Steam Trap Monitoring

January 2025

Cypress Contact: H. Sim
Email: harry.sim@cypressenvirosystems.com
Phone: +1 (408) 307-0922
Web: www.CypressEnvirosystems.com

CYPRESS ENVIROSYSTEMS™

Wireless Steam Trap Monitor (WSTM)



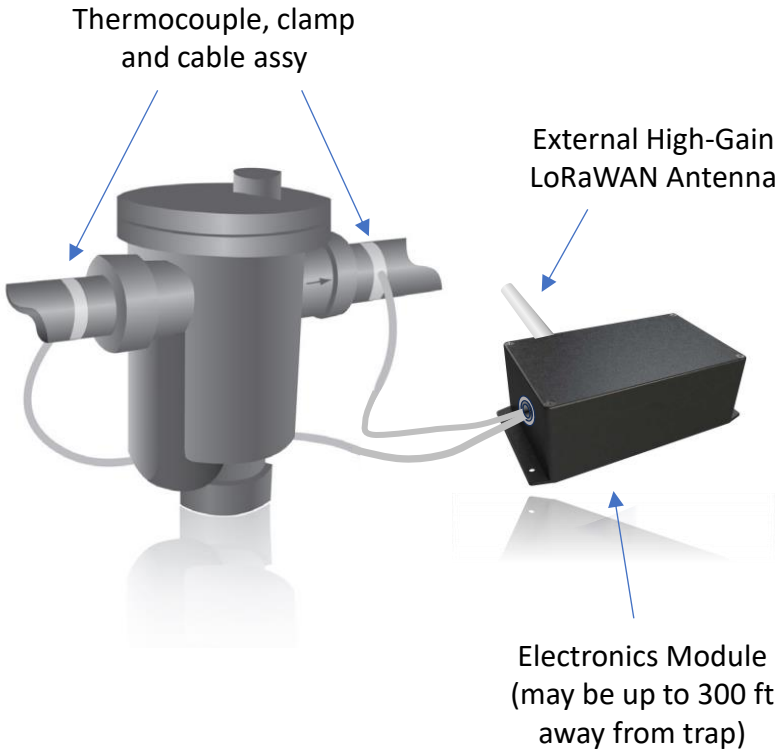
Leaking Traps Waste Energy

Typical Steam Trap

- Traps are a necessary part of the steam distribution system, usually hundreds of units per site
- 15-20% average failure rate; leaks steam
- Failed traps lose $5,000 per year (1/8” orifice)
- Manual inspection typically done annually – labor intensive, do not catch problems in timely manner
- Solution: Wireless steam trap monitor detects faults and alarms on error, avoiding expensive leak loss
- Non-invasive installation: no breaking seals, wireless, integrates with SCADA and BAS automation systems
- Battery life of 4 years at four-hour sample rate
- IP67 enclosure rated for outdoor use

CYPRESS ENVIROSYSTEMS™

WSTM Specifications

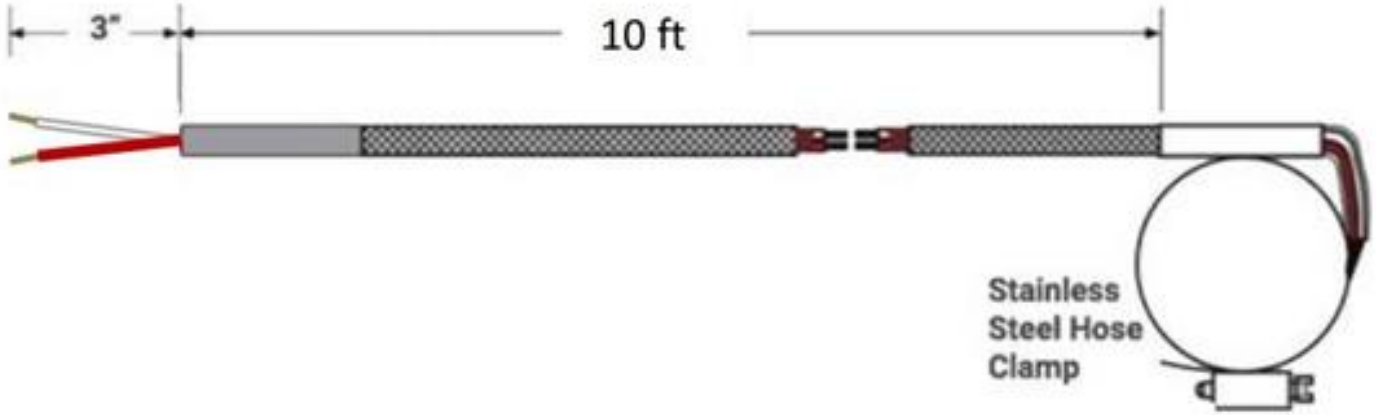


Data Inputs:	Thermocouple type K, cable and clamp assembly (sold separately)
Number of Inputs:	Two (inlet and outlet)
Data Capture Rate:	User selectable from three seconds to six hour sample rate
Wireless Frequency:	902 MHz to 928 MHz LoRa, 2.4 GHz for Bluetooth Low Energy
Wireless Range:	500 to 1,500 ft in typical plant environments
Modulation Method:	FSK, GFSK, and LoRa® Technology modulation
Approvals:	FCC CFR47, Part 15 Subpart C
Power Supply:	Standard 110-240VAC or battery powered (one C-size battery, type ER26500)
Battery Life:	>1 year at 5 minute sample rate, >4 years at 4 hour sample rate
Vibration:	Up to 4G RMS
Humidity:	10-99% RH, non-condensing
Operating Temperature:	-4°F to 158°F (-20°C to 70°C)
Storage Temperature:	-40°F to 176°F (-40°C to 80°C)
Enclosure:	Powder coated ADC-12 die cast aluminum alloy, IP67 rating with glands for cable entry
Dimensions:	9.09” x 4.72” x 2.95” (231 mm x 120 mm x 75 mm)
Weight:	3.5 lbs (1,587 g) including batteries
Antenna Length:	7 inches (178 mm)
Antenna Connector:	Brass
Cable Gland:	Brass

Thermocouple with clamp and cable assembly

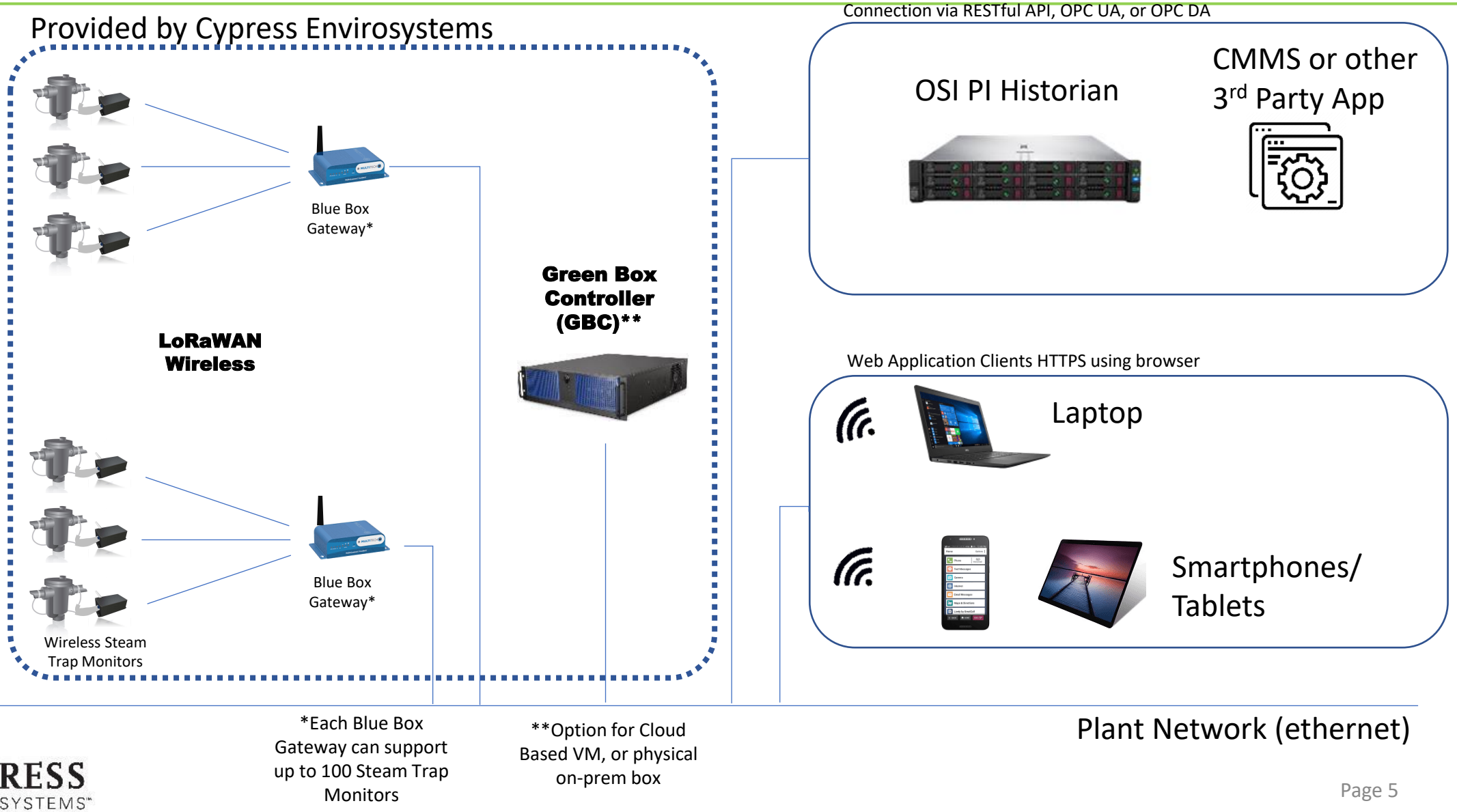
- Integrated type K thermocouple, hose clamp, and stainless steel braided cable.
- Hose clamp should have direct contact with pipe wall. Use thermal paste for improved thermal conductivity.
- Must remove insulation from pipe wall before installing thermocouple hose clamp.

Thermocouple with integrated 10 ft cable, for 1 inch OD pipe:
ACC-WTR-TC1-10 (part ACC-WTR-TCX-Y with X=1, Y=10)



CYPRESS ENVIROSYSTEMS™

Typical Deployment Architecture



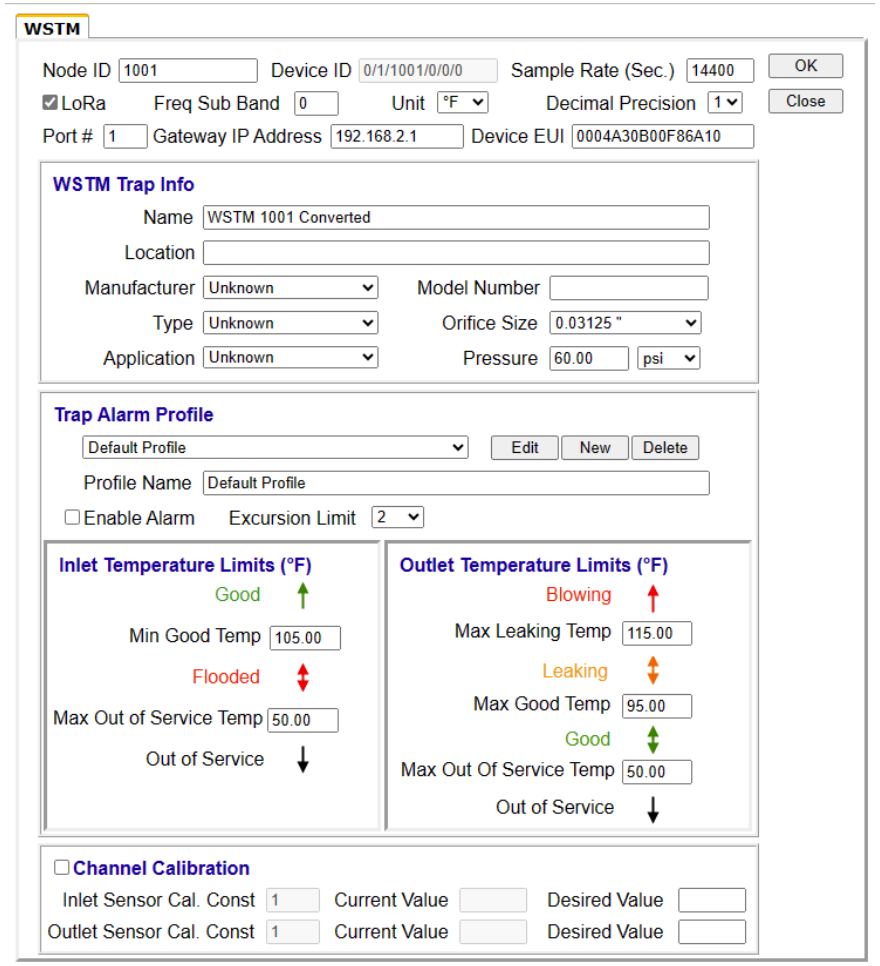
CYPRESS ENVIROSYSTEMS™

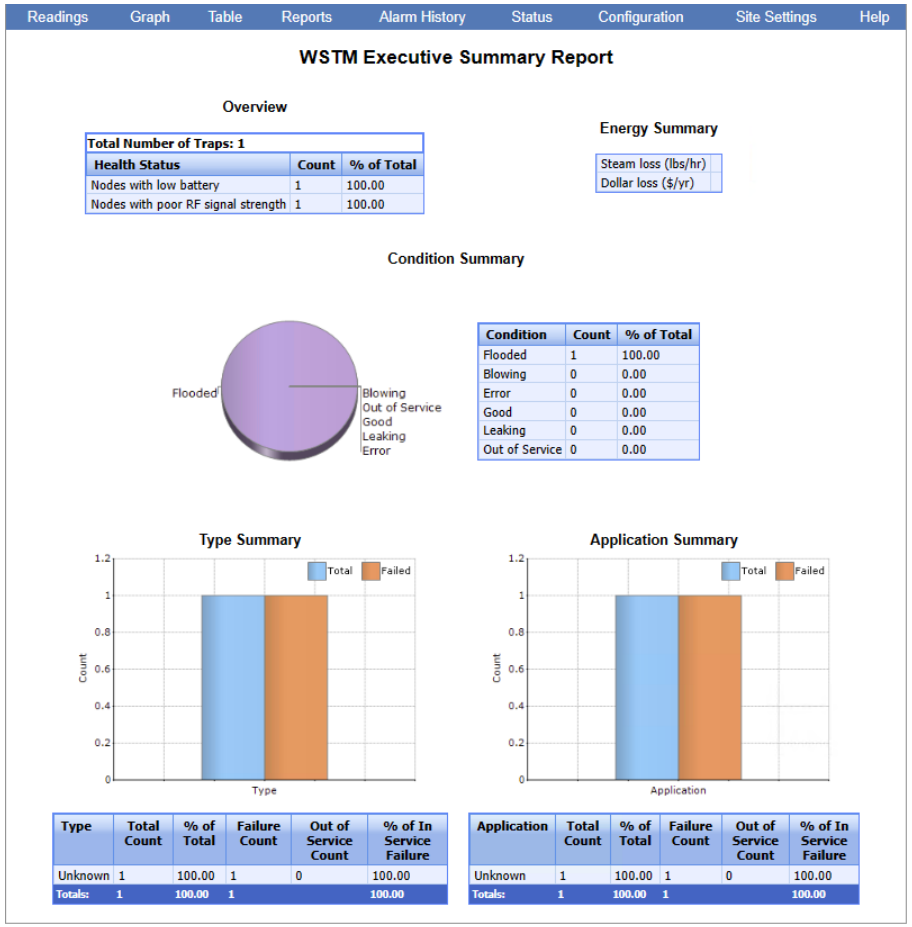
Steam Trap Fault Detection Methodology (example)

- Fault Detection uses delta between inlet and outlet temperatures (thermal method).
- Thermal method provides early remote detection of abnormal operation.
- Typically, operators would follow-up with hand-held test devices a the physical trap location to confirm and perform corrective action.

CYPRESS ENVIROSYSTEMS

GBC Includes Steam Trap Fault Detection Analytics

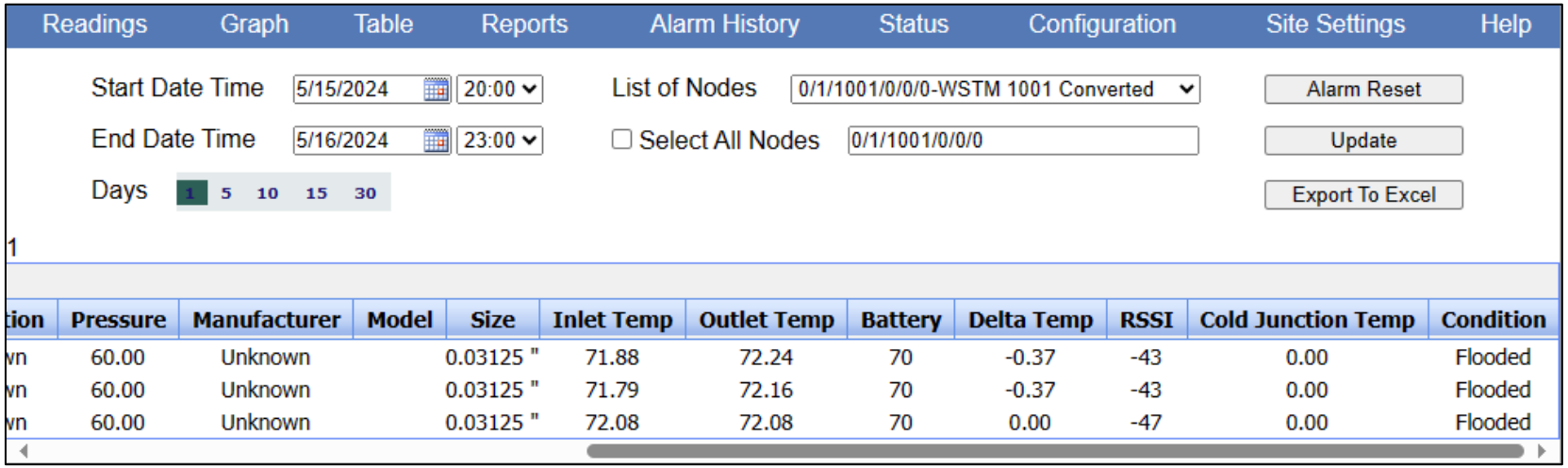




CYPRESS ENVIROSYSTEMS™

Alarm Notifications via Email or SMS

- Configurable alarms enable notification of abnormal status via email or SMS.



tion	Pressure	Manufacturer	Model	Size	Inlet Temp	Outlet Temp	Battery	Delta Temp	RSSI	Cold Junction Temp	Condition
wn	60.00	Unknown		0.03125 "	71.88	72.24	70	-0.37	-43	0.00	Flooded
wn	60.00	Unknown		0.03125 "	71.79	72.16	70	-0.37	-43	0.00	Flooded
wn	60.00	Unknown		0.03125 "	72.08	72.08	70	0.00	-47	0.00	Flooded

CYPRESS ENVIROSYSTEMS

Payback Analysis Calculator

- Use calculator to determine which steam traps are the best candidates for monitoring based on investment payback.

WSTM Payback Calculator[2] (years)

WSTM Installed Cost[3]:

$1000 per unit

Your Steam Cost:

$15 per 1,000 lbs.

Inspection Frequency[4]:

1 times/year

Inspection Costs[5]:

$5 per trap

Facility Uptime:

365 days/year

Failure Rate[6]:

20% per year

Steam Trap Orifice Diameter[1]

Steam Pressure PSI (gauge)	1/32"	1/16"	3/32"	1/8"	5/32"	3/16"	7/32"	1/4"	9/32"	5/16"	11/32"	3/8"	13/32"	7/16"	15/32"	1/2"
5	89.9	33.9	16.7	9.8	6.4	4.5	3.3	2.6	2.0	1.7	1.4	1.2	1.0	0.9	0.8	0.7
10	78.9	28.0	13.5	7.9	5.1	3.6	2.7	2.1	1.6	1.3	1.1	0.9	0.8	0.7	0.6	0.6
15	70.3	23.9	11.4	6.6	4.3	3.0	2.2	1.7	1.4	1.1	0.9	0.8	0.7	0.6	0.5	0.5
25	57.7	18.4	8.7	5.0	3.2	2.3	1.7	1.3	1.0	0.9	0.7	0.6	0.5	0.5	0.4	0.4
50	39.9	11.7	5.4	3.1	2.0	1.4	1.1	0.8	0.7	0.5	0.5	0.4	0.3	0.3	0.3	0.2
75	30.4	8.6	4.0	2.3	1.5	1.0	0.8	0.6	0.5	0.4	0.3	0.3	0.3	0.2	0.2	0.2
100	24.6	6.8	3.1	1.8	1.2	0.8	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2
125	20.7	5.6	2.6	1.5	1.0	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
150	17.8	4.8	2.2	1.3	0.8	0.6	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1
175	15.7	4.2	1.9	1.1	0.7	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1
200	14.0	3.7	1.7	1.0	0.6	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1
225	12.6	3.3	1.5	0.9	0.6	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
250	11.5	3.0	1.4	0.8	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
275	10.6	2.8	1.3	0.7	0.5	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
300	9.8	2.6	1.2	0.7	0.5	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1

Payback Period

0 - 2 Years **2 - 8 Years** **8+ Years**

1. Orifice diameter should not be confused with pipe diameter. Consult the steam trap manufacturer if orifice size is not known.
2. Calculations are theoretical estimates and actual results will vary. Payback calculation includes avoided lost steam and inspection labor. Benefits from avoided damage resulting from blocked traps are not included in model. The formula used for steam loss in this model is: L=24.24*Pa*D2. Where L=pounds/hour, Pa=Pgauge + Patm , D=orifice diameter.
https://www1.eere.energy.gov/manufacturing/tech_deployment/pdfs/steam_pressure_reduction.pdf
3. Actual WSTM installed cost will vary based on volume and integrator.
4. Refers to the manual inspections of steam traps that are currently being done at the facility. The frequency determines the potential avoided failure time when using the WSTM.
5. The frequency and cost of inspection determine the labor savings enabled by the WSTM.
6. The failure rate per year should be based on historical data from the facility. 15-20% failure rates per year are typical. In unmaintained facilities, the failure rate can be much higher:
https://www1.eere.energy.gov/femp/pdfs/om_combustion.pdf

CYPRESS ENVIROSYSTEMS™

Existing Customers - sample

- Lockheed Martin Energy Services
- Johnson Controls
- Veterans Administration Medical Centers
- New York City Health + Hospitals Corporation